

Initial Evaluation of the SSF/Ed2QC VIRS Aerosols: 3rd Generation with Adjusted 1.6 μm Thermal Leak Correction

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CHANGES SSF: Ed2QC vs Ed1c

1.6 μm : Thermal Leak Algorithm

Barnes' Detector Temperature Correction Implemented

VIRS Aerosol Algorithms: 2nd versus 3rd

	2 nd Generation Algorithm	3 rd Generation Algorithm
Input	Pixel Data	SSF Data
Retrievals	Independent Channel	Dependent Channel
Retrieval Model	Prescribed	Estimated from VIRS Channels 0.63 & 1.6 μm
RT Model	Dave' (1973)	6S (1997)
Aerosol Microphysics	Mono-Modal Log-Normal (Fixed Mode)	Bi-Modal Log-Normal (Fixed Modes; Variable Mixing Ratio)
Aerosol Absorption	No	Yes
Surface Model	Lambertian + Diffuse Glint (Simplified Single Scattering Treatment, Plane Surface)	Lambertian (Same) + Accurate Fresnel's Reflection, Rough Surface ($W=1\text{m/s}$)

OBJECTIVES

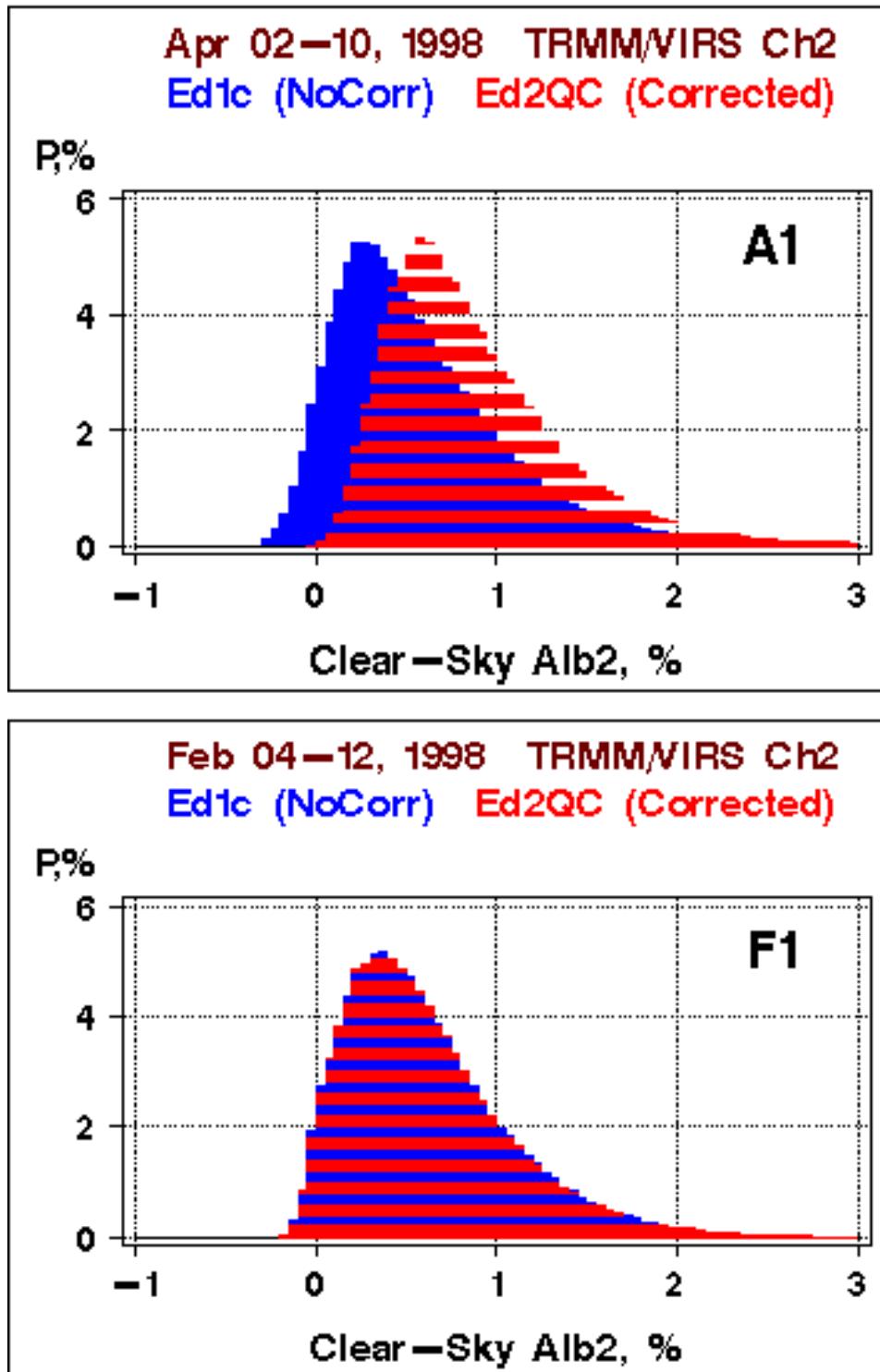
- Check Implementation of 3rd Gen
(≡Combination of 2nd and 3rd) Algorithm
- Compare Ed1c/Ed2QC Statistics
- Effect of Barnes' Thermal Leak Adjustment
- Effect of 2nd/3rd Gen Algorithm Change

TWO GLOBAL DATASETS

9 Full Days (216 Hourly Files); 7-8 Gb

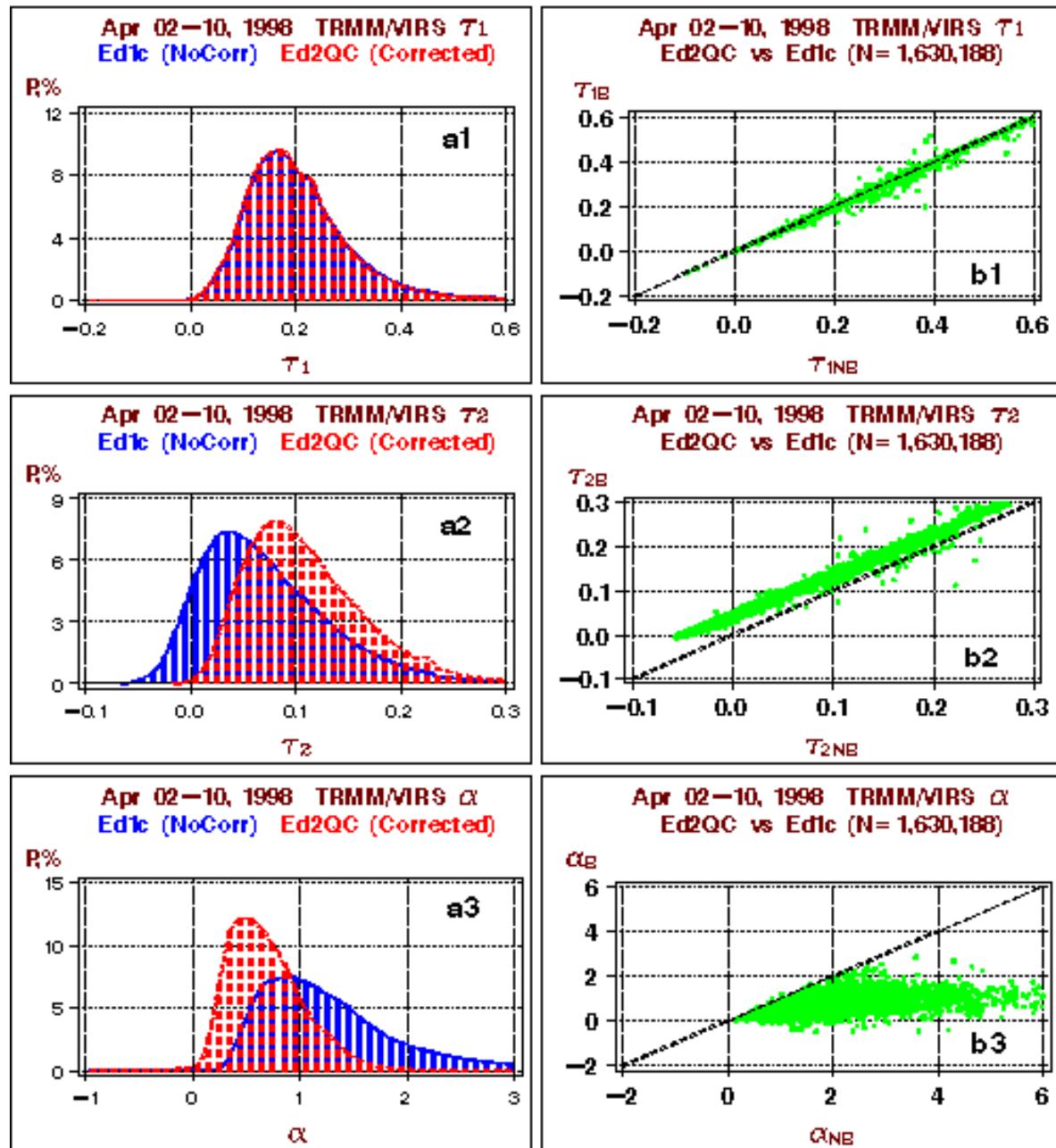
	Ed1c 2 nd Gen (No Barnes)	Ed2QC 3 rd Gen (Barnes)
Feb 04-12, 1998	$N=1,786,442$ $\tau_1=0.18(0.11)$ $\tau_2=0.09(0.07)$	$N=1,790,867$ $(+0.2\%)$ $\tau_1=0.16(0.11)$ (-0.02) $\tau_2=0.07(0.07)$ (-0.02)
Apr 02-10, 1998	$N=1,660,647$ $\tau_1=0.21(0.13)$ $\tau_2=0.08(0.07)$	$N=1,650,475$ (-0.6%) $\tau_1=0.20(0.12)$ (-0.01) $\tau_2=0.11(0.07)$ $(+0.03)$

Effect of Barnes Correction on Ch2

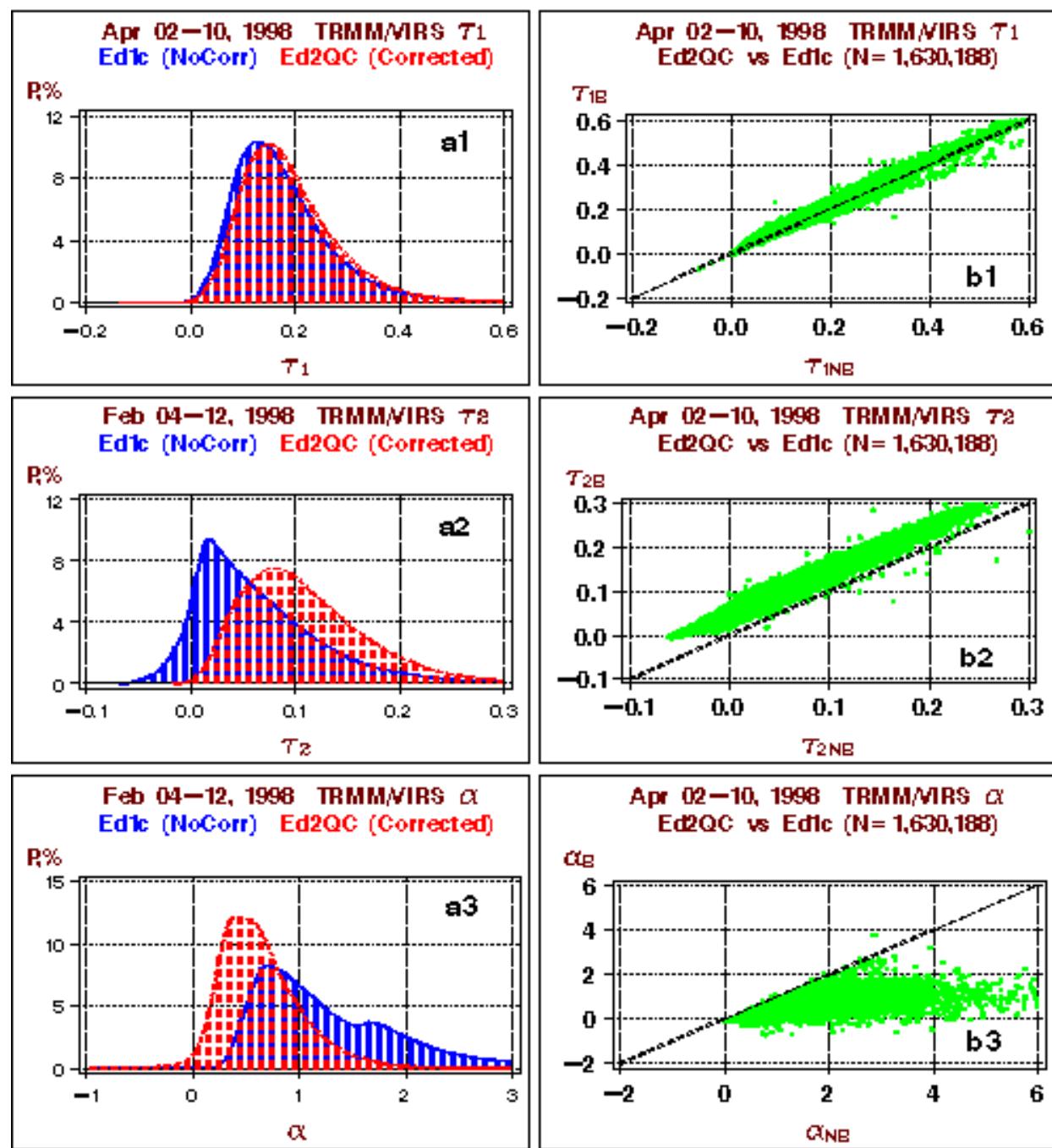


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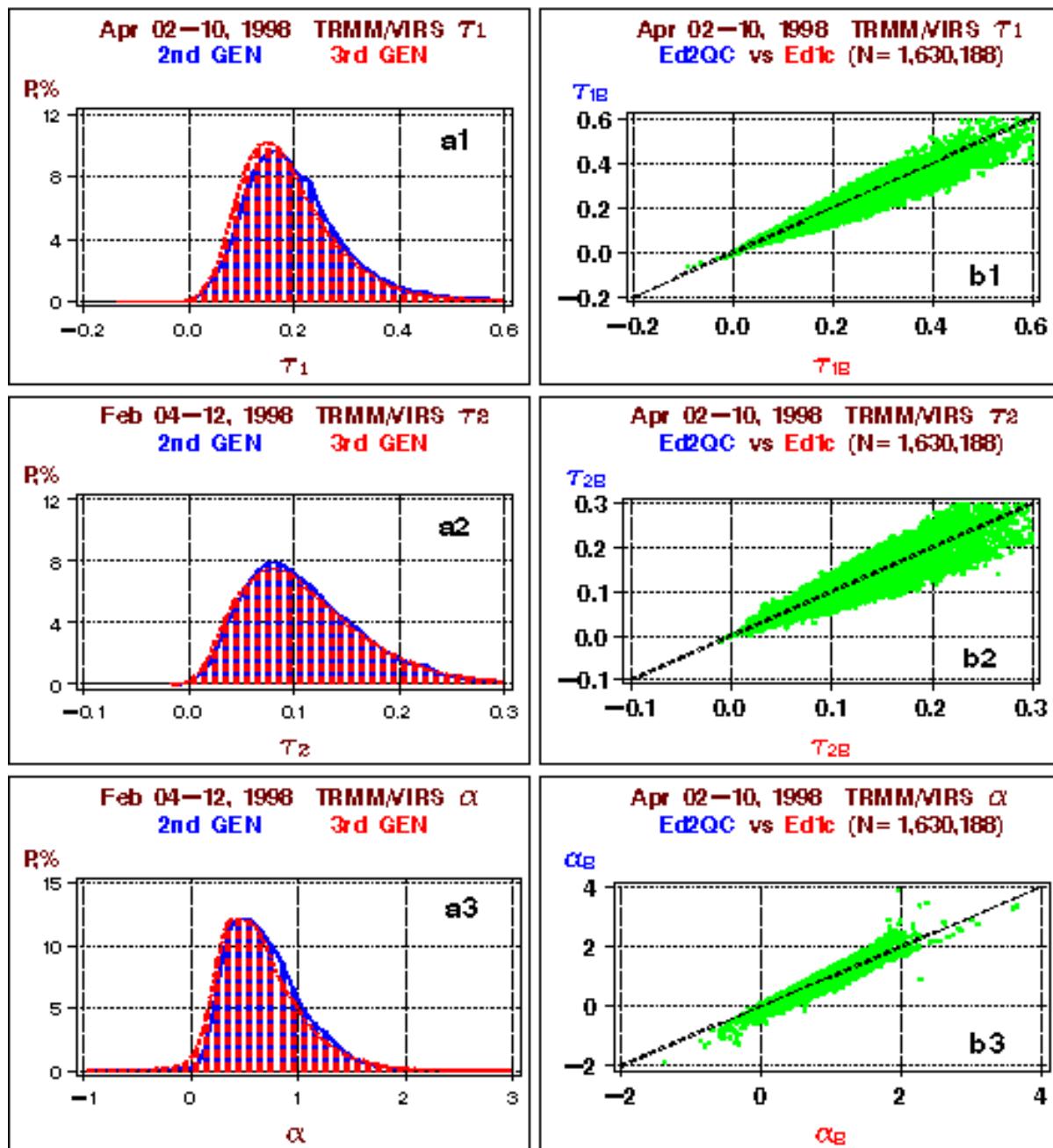
Effect of Barnes Correction on Aerosols (2nd Gen)



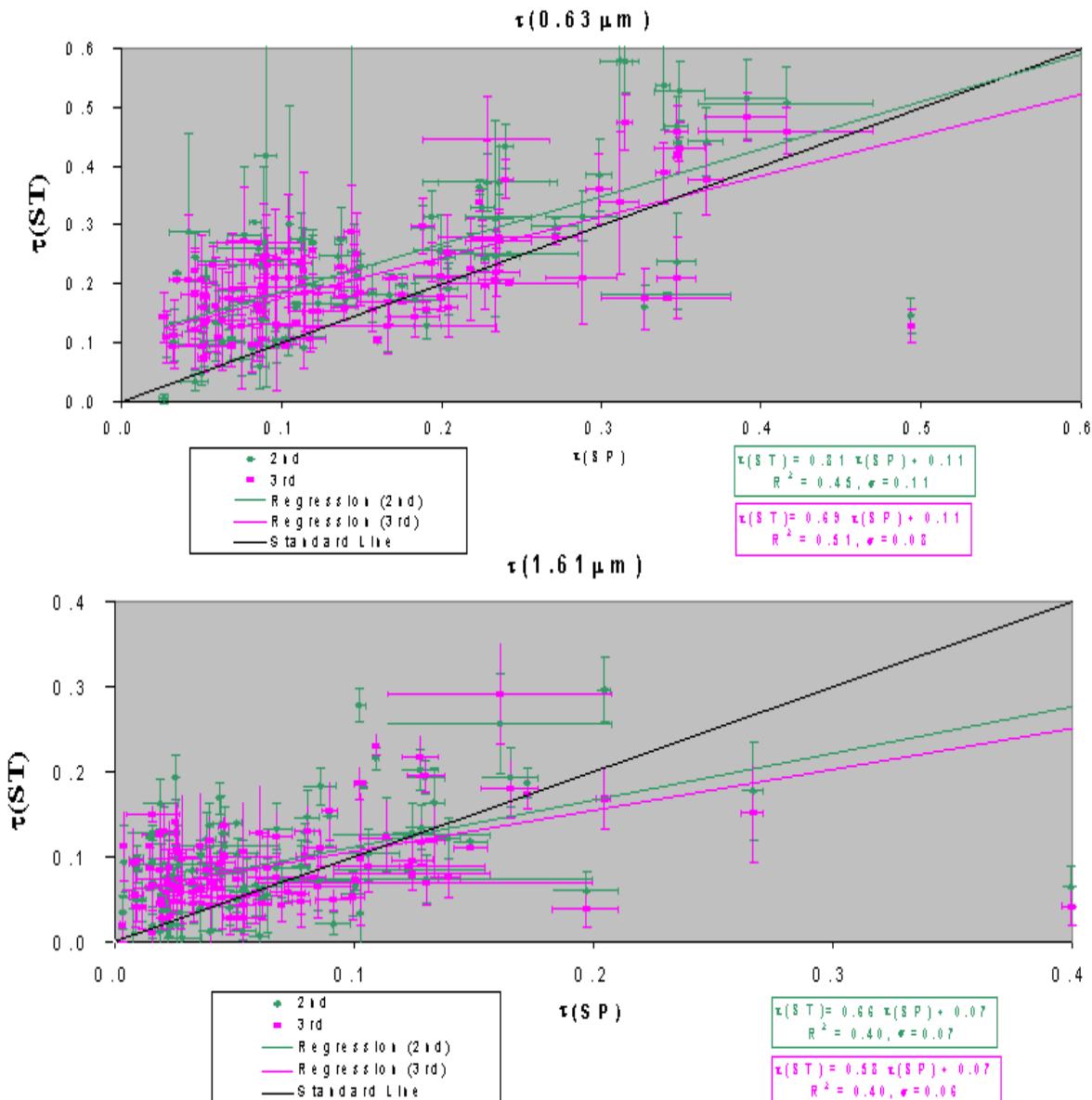
Effect of Barnes Correction on Aerosols (3rd Gen)



Effect of Algorithm Change on Aerosols: 3rd Gen vs 2Gen



Validation of 2nd and 3rd Generation Algorithm (1998 SSF-ED1 Data vs. AERONET)



CONCLUSION

3rd Gen Aerosol Algorithm implemented (SSF Ed2QC)
Derives τ_1 , τ_2 , α (more accurately), and η , R_{eff}

Effect of Barnes' Thermal Leak Adjustment

Works OK Apr 02-10, 1998

3rd Generation (Dependent Channel Retrievals)

- τ_1 : May change within $\sim+15\%$
- τ_2 : Increased by $\sim+0.05 \pm 0.04$
- α : Strongly affected
- Frequency distributions of τ_2 and α : Significant Change

Does NOT work Feb 04-12, 1998

Effect of Change in Algorithm: 3rd vs 2nd

Estimated with Barnes' Adjusted Data (Apr'98; Ed2QC)

- τ_1 : Lower by $\sim(-10 \pm 30)\%$
- τ_2 : Lower by $\sim(-10 \pm 30)\%$
- α : Within ± 0.2
- Mode of Frequency Distributions: $\Delta\tau_1 \sim -0.02$; $\Delta\tau_2 \sim -0.01$; $\Delta\alpha \sim -0.1$

Validation

- Perform comparably
- Smaller Random Error
- Lower Slope

PLANS

- Comprehensive Consistency Checks of τ_1 , τ_2 , α , η , R_{eff}
- Validate to see effect of Barnes' Adjustment
- Identify Problems & Alert Users
- Document in peer-reviewed literature
- Document in SSF Quality Summary

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